NaturalMash

Università della Svizzera italiana | Faculty of Informatics

Natural End-User Development of Mashups

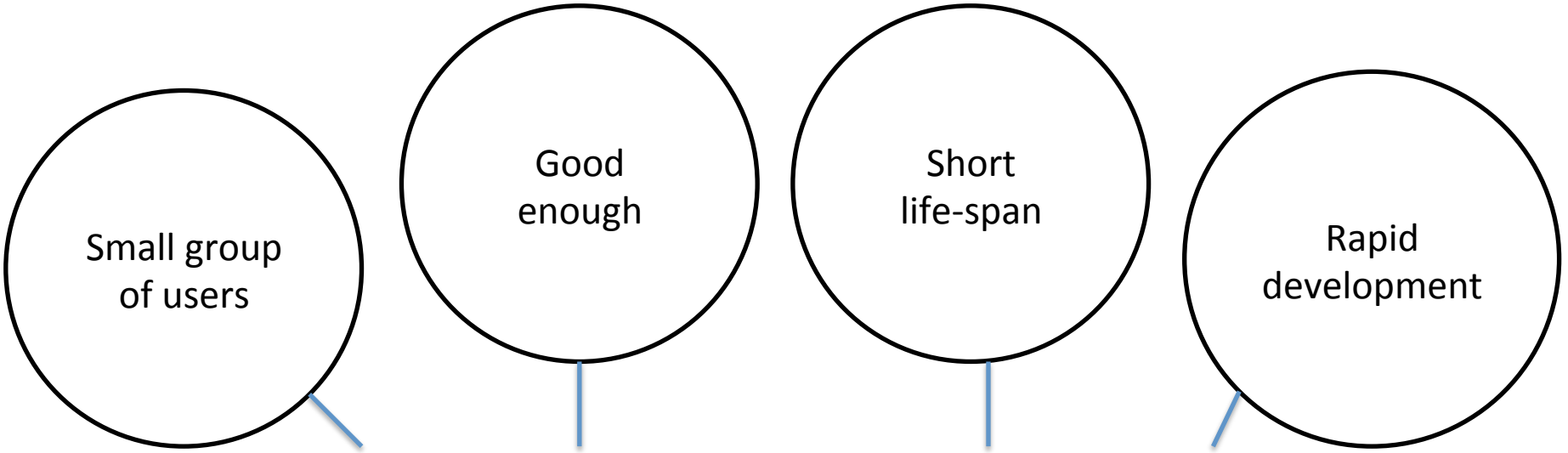
Saeed Aghaee, Cesare Pautasso, and Antonella De Angeli

Faculty of Informatics
University of Lugano (USI)
Switzerland

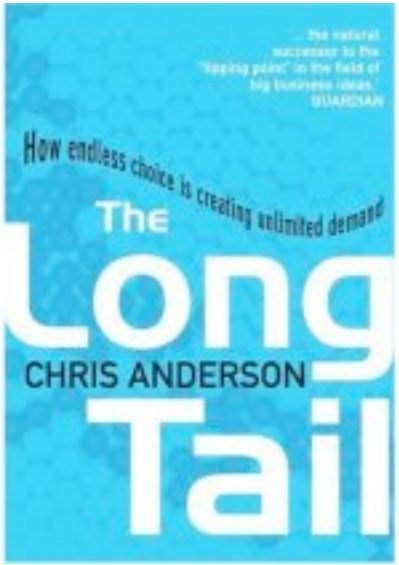
DISI
University of Trento
Italy

Email: saeed.aghaee@usi.ch
Twitter: @mr_wersa, @naturalmash
Website: http://naturalmash.com

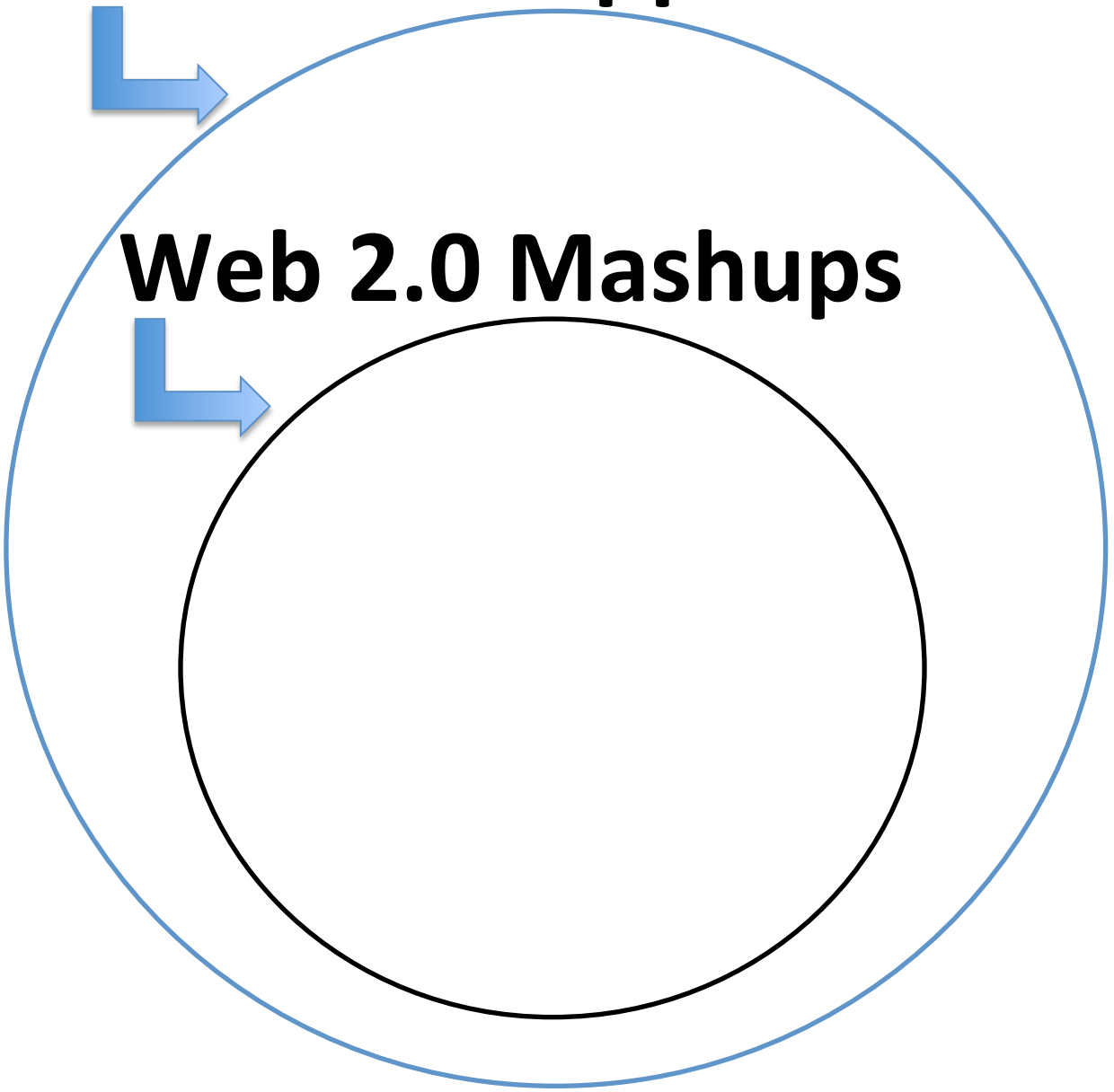
Situational Applications

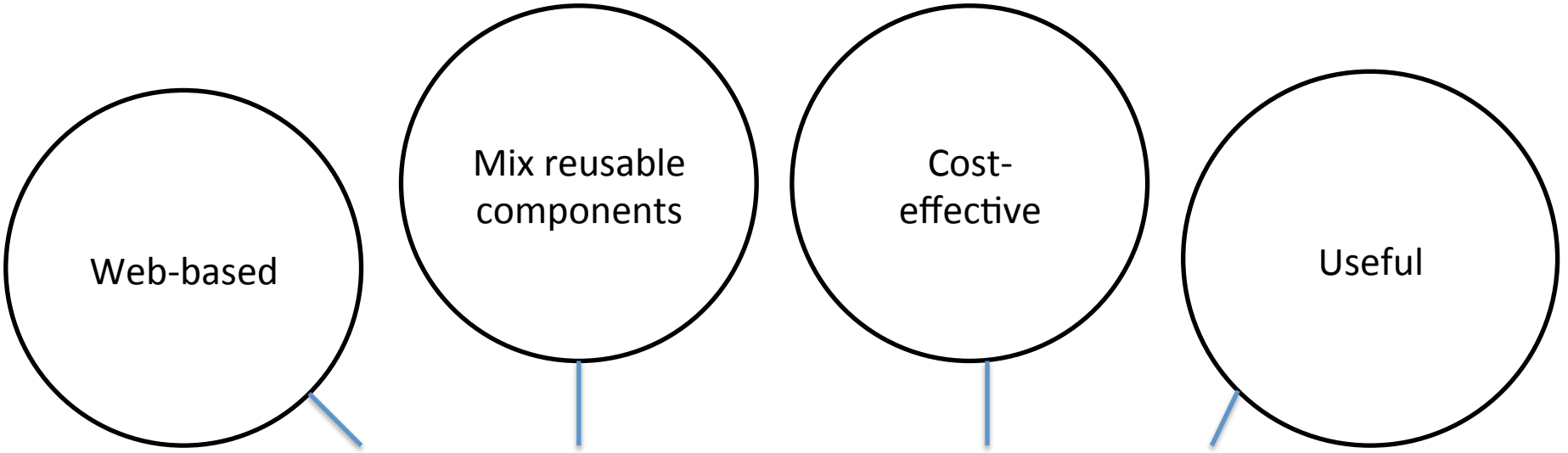


Situational Applications



Situational Applications





Web 2.0 Mashups


digg™ api
Technorati
NETFLIX
Google Code
PayPal
Google maps
flickr BETA
YouTube
wikia
BBC NEWS
amazon web services
ebay
last·fm
tryntech
box
foursquare
twilio CLOUD COMMUNICATIONS
oodle
MediaWiki
yelp
bing
shopzilla

Traditional Software Development model

Developers vs. Users

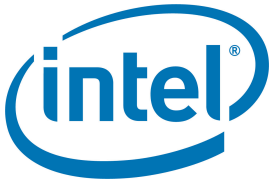
Traditional Software Development model

Developers vs. Users

Develop-it-yourself

End-user mashup development for everyone on the Web

MarcoFlow



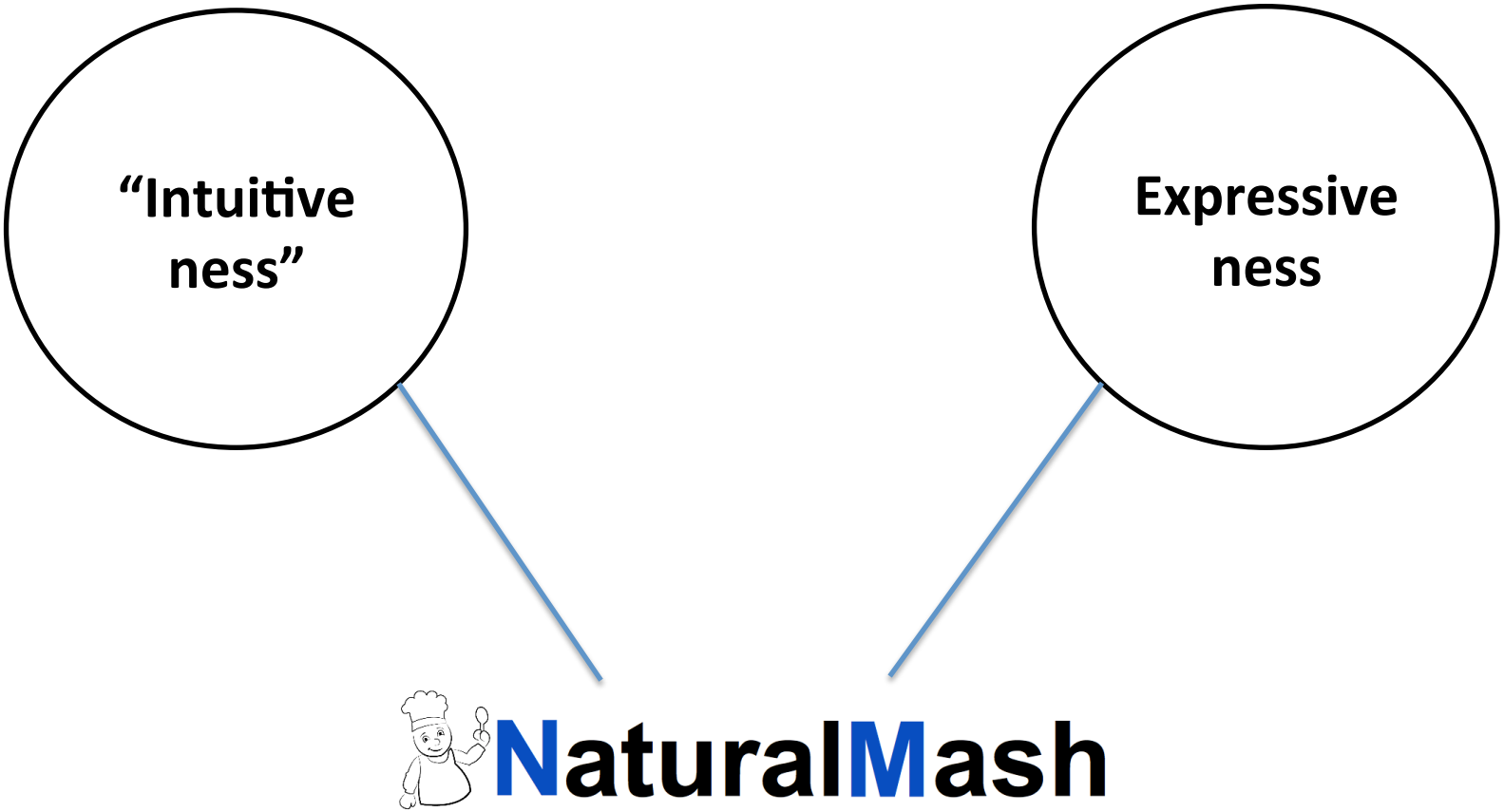
dapper

Too specialized/complex for non-professional users

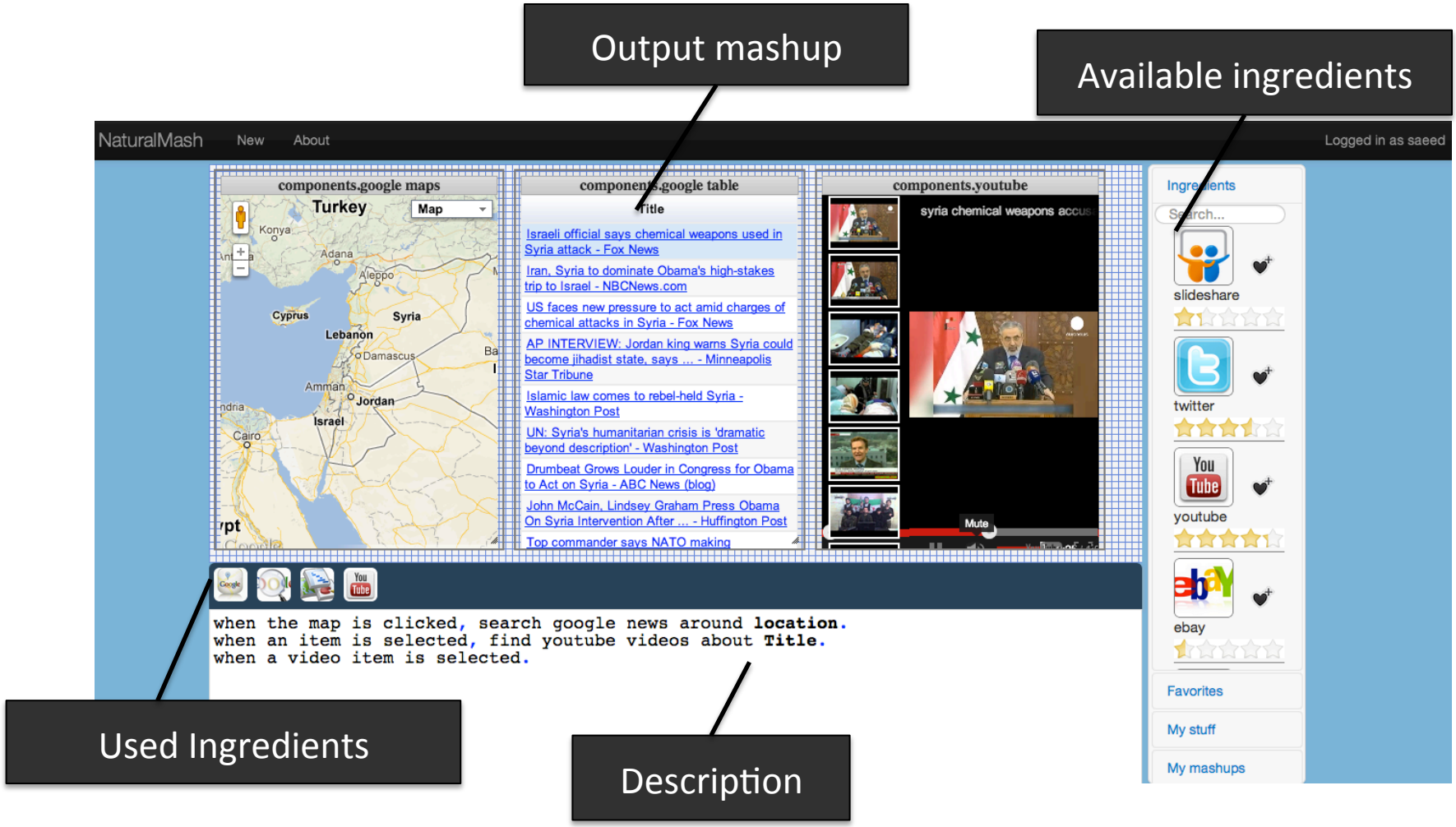
Too simplified


Bridge the gap between
what the programmable Web has to
offer and what end-users are readily
capable of

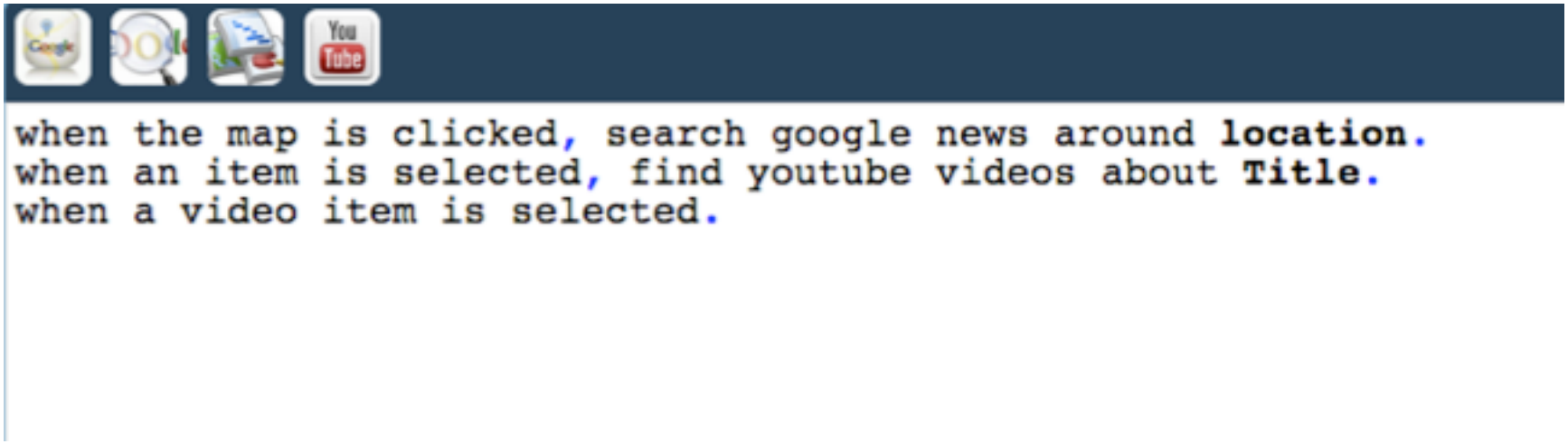

NaturalMash


“Intuitive ness”
Expressive ness
NaturalMash

Developing mashup using natural language and visual interaction

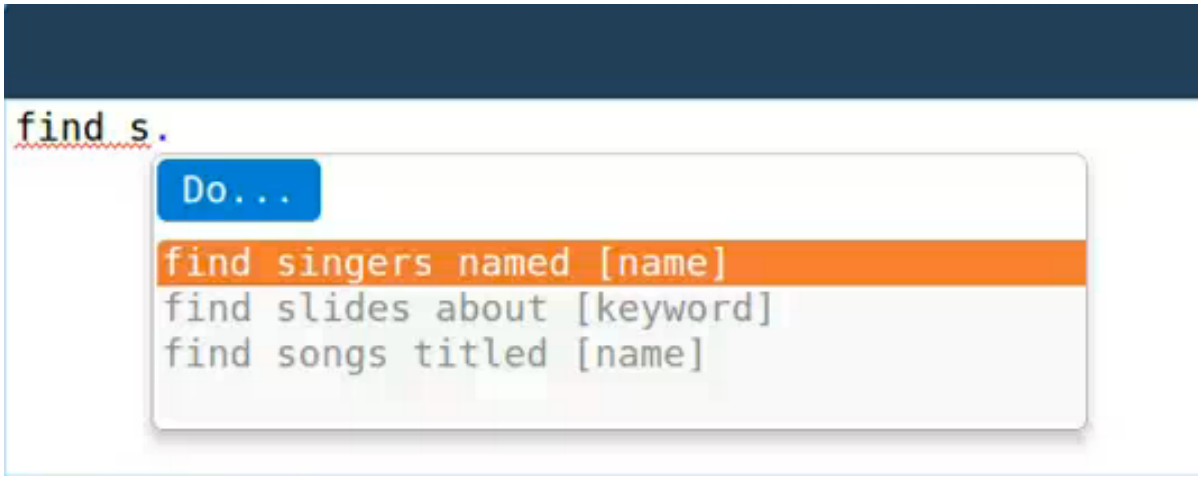

Output mashup
Available ingredients
NaturalMash
New
About
Logged in as saeed
components.google maps
Turkey
Map
Konya
Adana
Aleppo
Cyprus
Syria
Lebanon
Damascus
Amman
Jordan
Israel
Cairo
components.google table
Title
Israeli official says chemical weapons used in Syria attack - Fox News
Iran, Syria to dominate Obama's high-stakes trip to Israel - NBCNews.com
US faces new pressure to act amid charges of chemical attacks in Syria - Fox News
AP INTERVIEW: Jordan king warns Syria could become jihadist state, says ... - Minneapolis Star Tribune
Islamic law comes to rebel-held Syria - Washington Post
UN: Syria's humanitarian crisis is 'dramatic beyond description' - Washington Post
Drumbeat Grows Louder in Congress for Obama to Act on Syria - ABC News (blog)
John McCain, Lindsey Graham Press Obama On Syria Intervention After ... - Huffington Post
Top commander says NATO making
components.youtube
syria chemical weapons accus
Mute
Ingredients
Search...
slideshare
twitter
youtube
ebay
Favorites
My stuff
My mashups
when the map is clicked, search google news around location.
when an item is selected, find youtube videos about Title.
when a video item is selected.
Used Ingredients
Description

Natural Language based Integration



Event-based ("when the map is clicked, ..") and sequential ("find youtube videos about title, and ...") integration styles

Natural Language Autocompletion

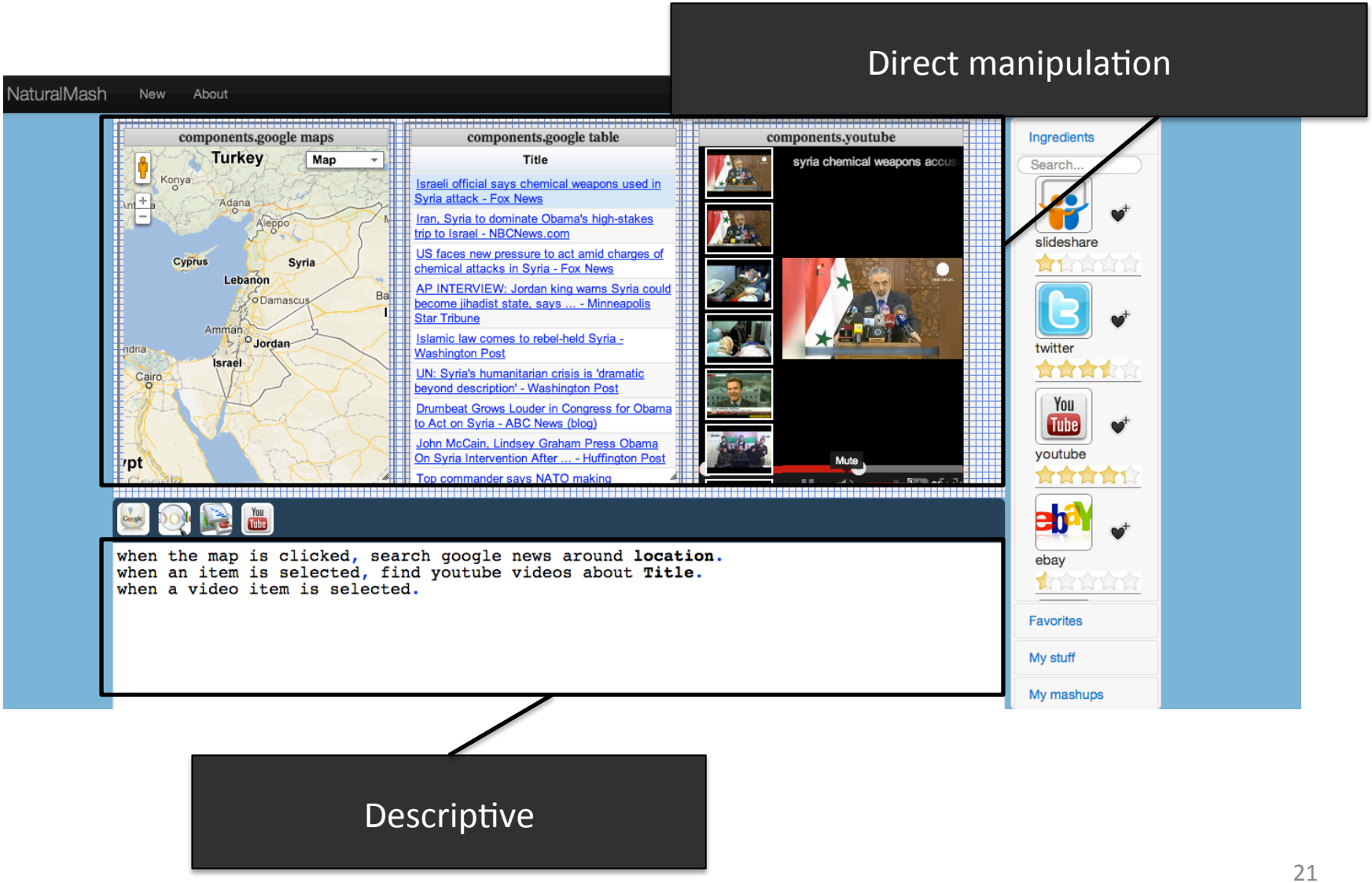


Every API has a short description with natural language (autocompletion helps with discovery)

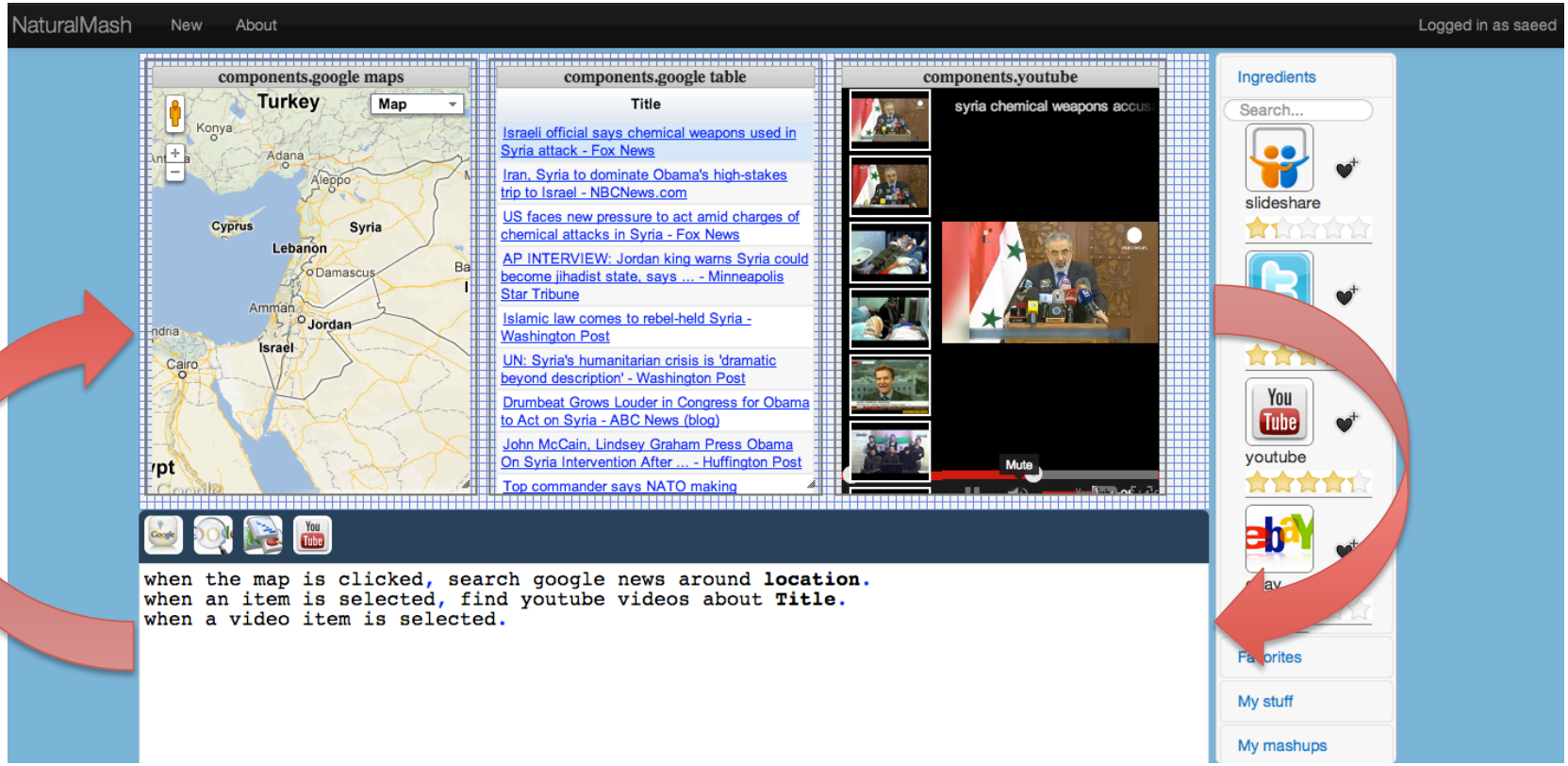
User Interface Design

Move and resize widgets

Programming by Demonstration (PbD)



Live Programming Style

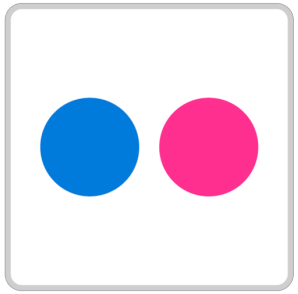


Main Features

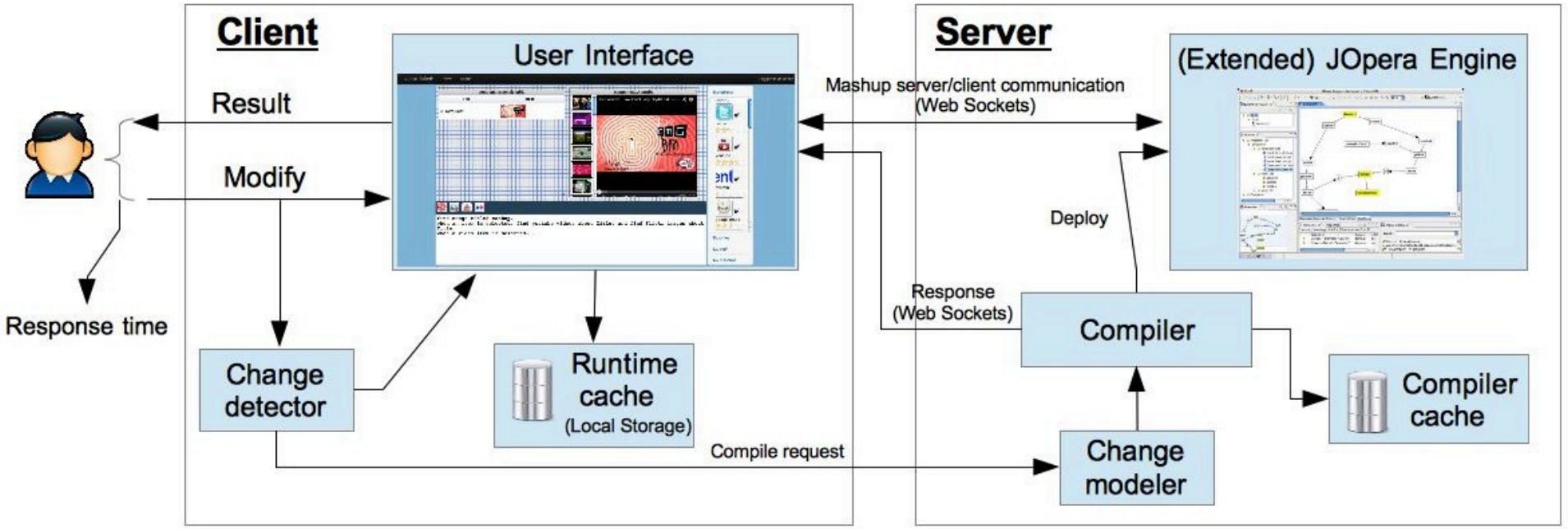
Requirements / Decisions	Expressiveness	Intuitiveness
Natural Language Programming	X	X
Autocompletion		X
UI Design (WYSIWYG)	X	X
PbD	X	X
Live Programming		X

Demo

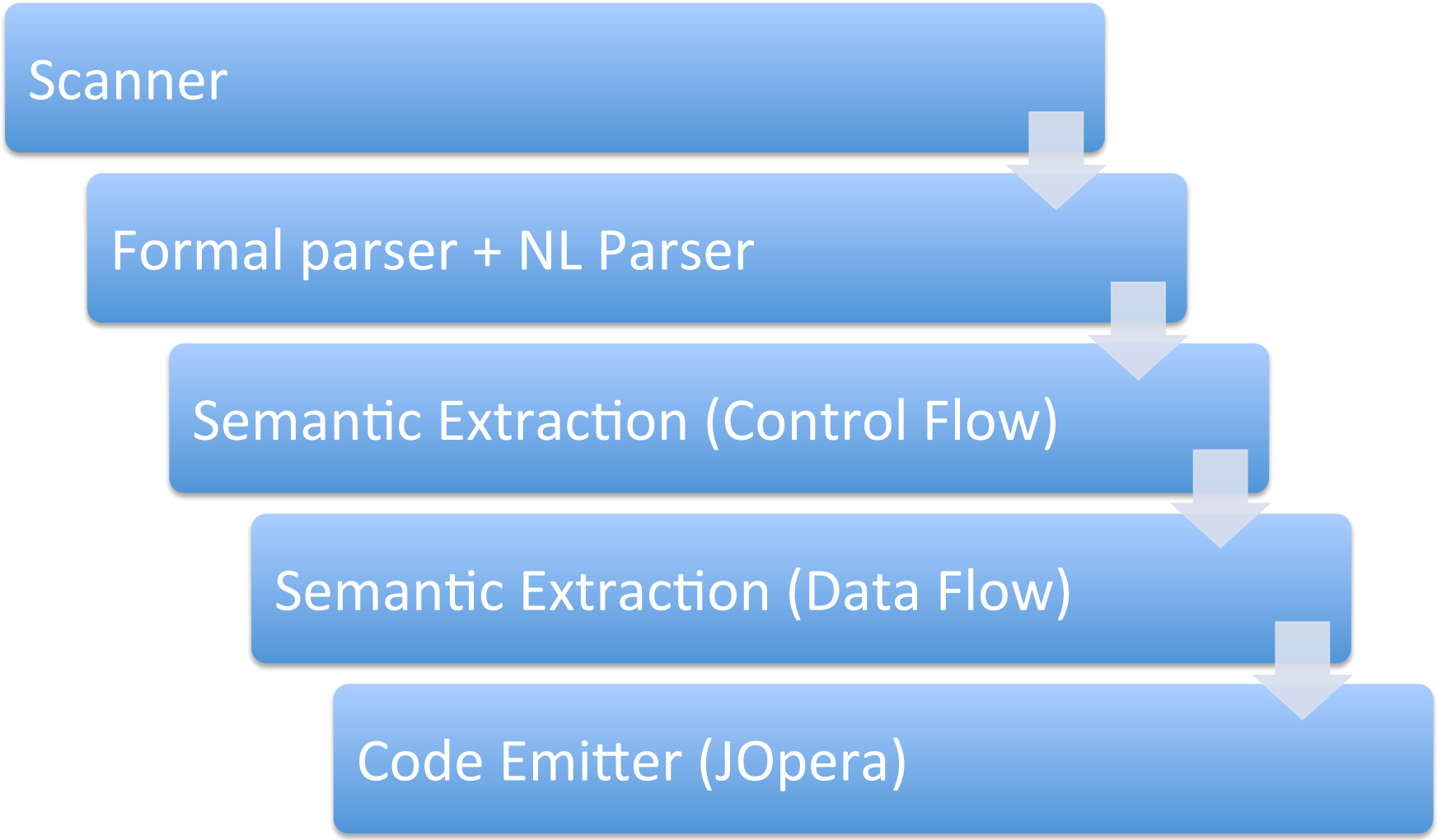
Shopping Assistant Mashup



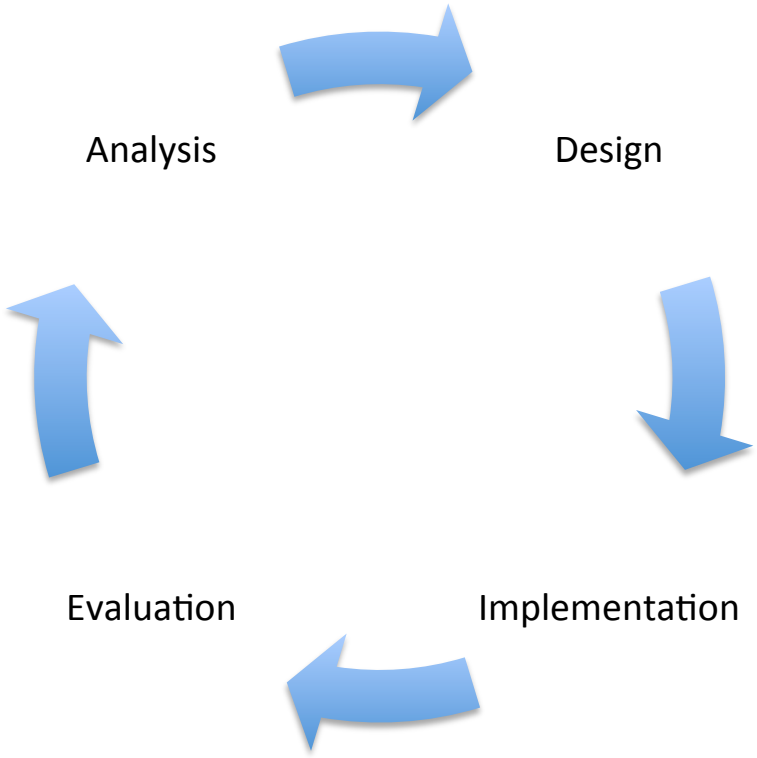
Architecture



Compiler

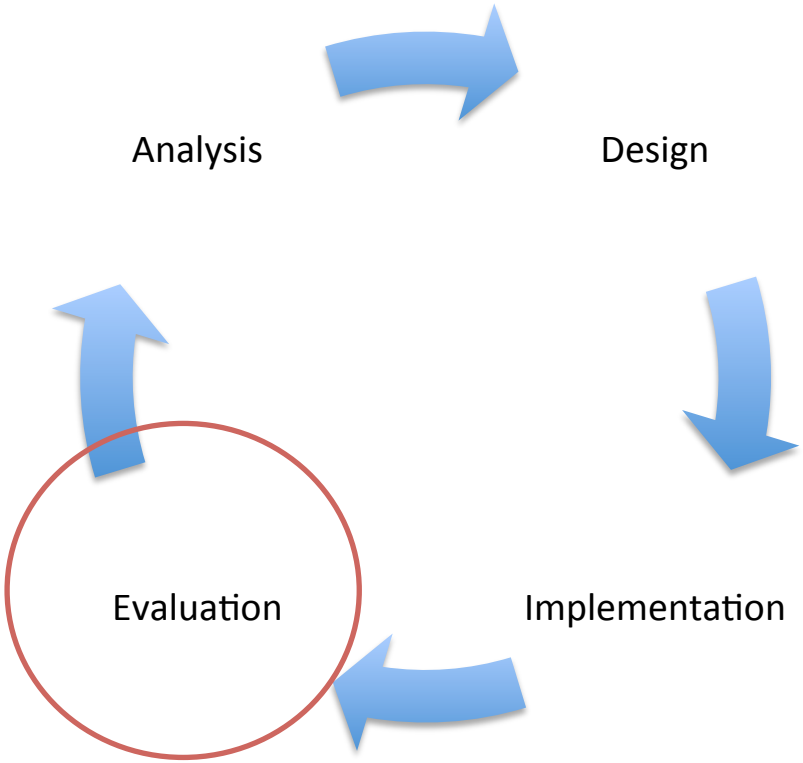

Scanner
Formal parser + NL Parser
Semantic Extraction (Control Flow)
Semantic Extraction (Data Flow)
Code Emitter (JOpera)

Iterative User-centered Design and Development



Two iterations are completed

Iterative User-centered Design and Development



Two iterations are completed

Formative Evaluation: Goals

Main Goal:
Identify usability problems to help correctly drive the design.

Sub Goal:
Assess the success of the design in meeting the requirements (expressiveness and naturalnesss)

Formative Evaluation: Participants

Sampling:
36 participants (iteration 1: 12, iteration 2: 24) were selected by convenience method from high school students, first year BSc students, and university staff.

Background:
diverse background (20 non-programmers and 16 novice programmers)

Formative Evaluation: Methods

Task-based

Questionnaire

Screen and session recording (Iteration 2)

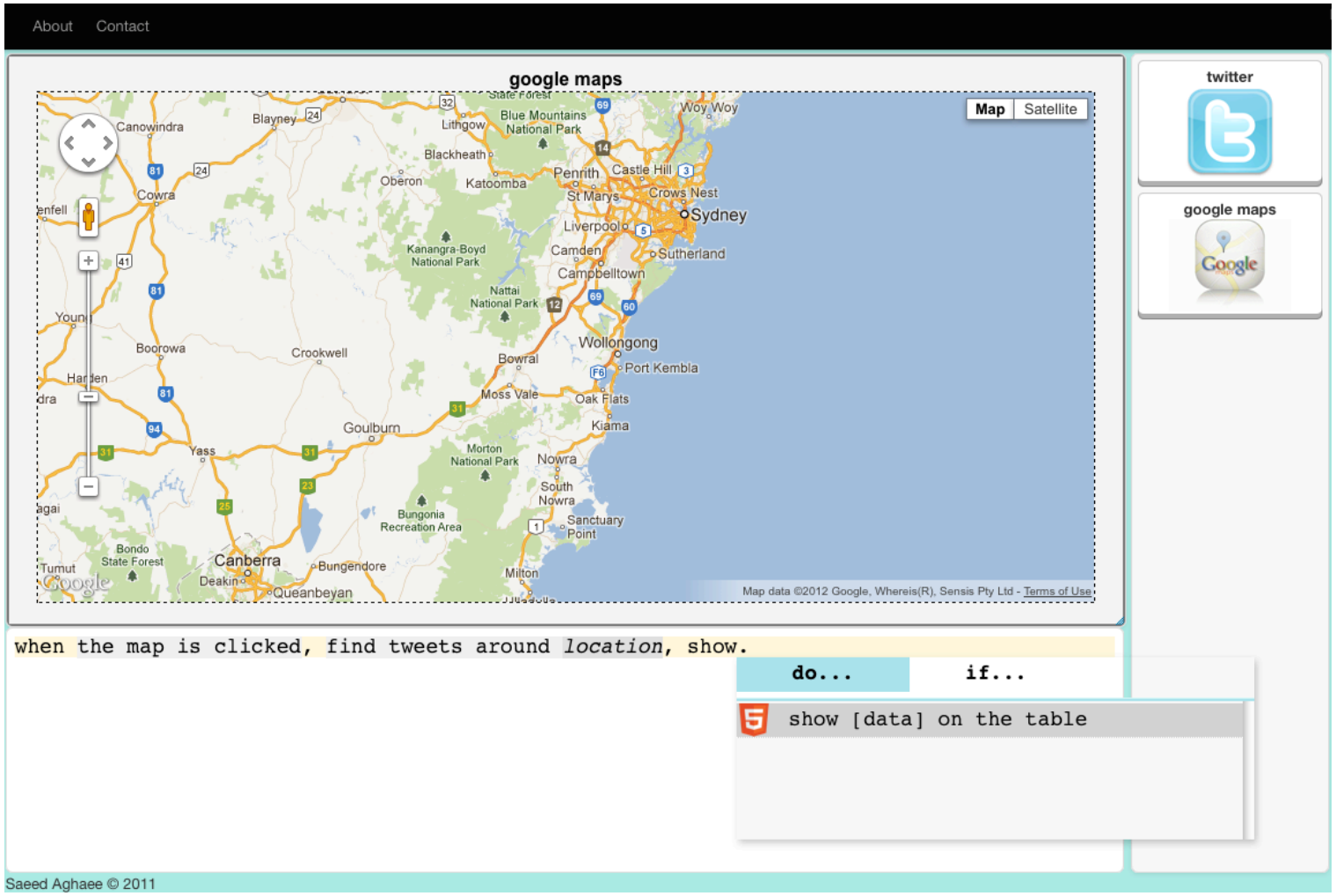
Interview (Iteration 2)

Formative Evaluation: Tasks

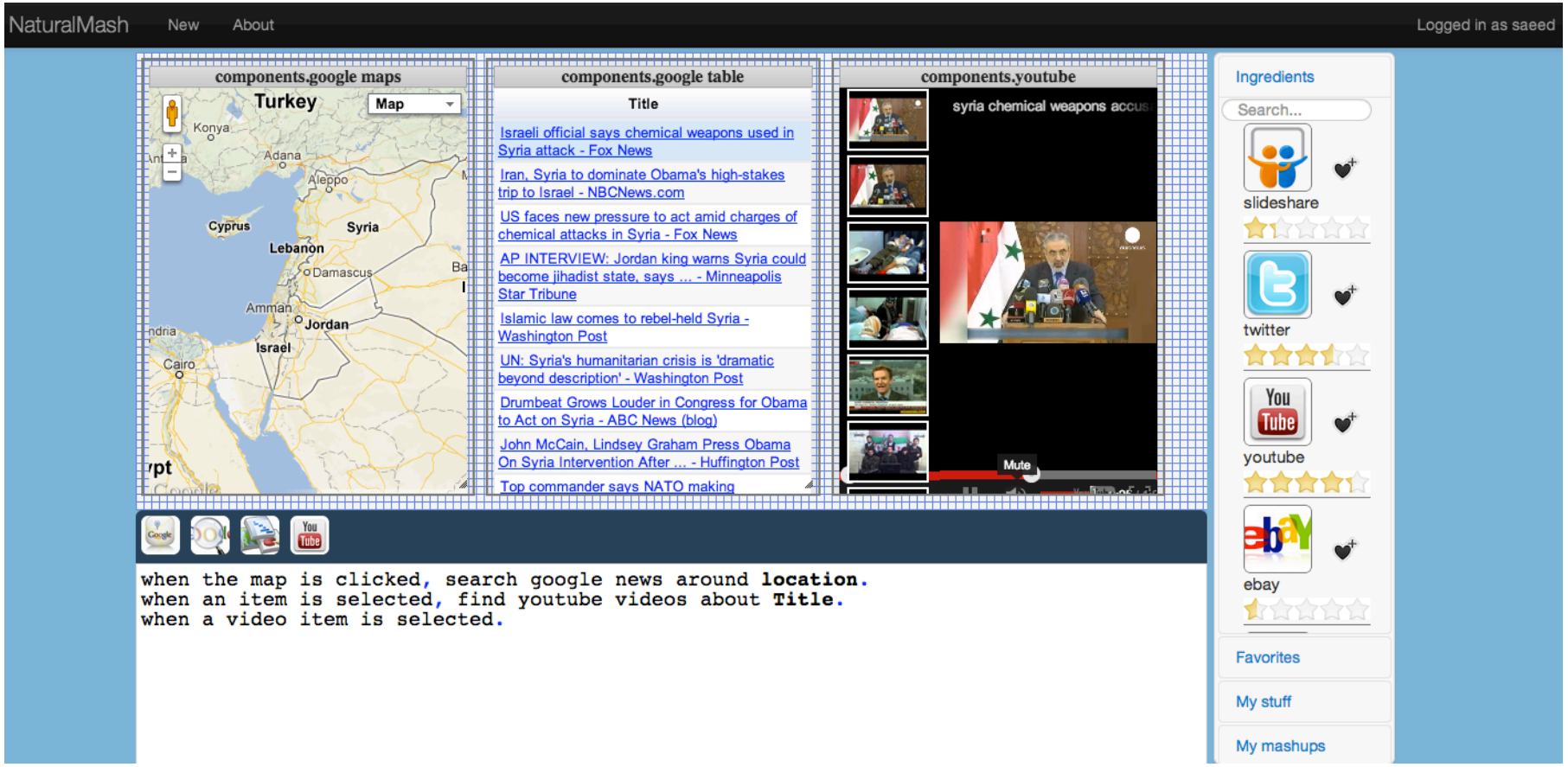
Pre-constructed task:
4 different (given) mashups with increasing complexity (number of components)

Open (self-generated) task
A mashup proposed by the individual participant

Iteration 1 version



Iteration 2 version



Feature Additions (**Iteration 1**)

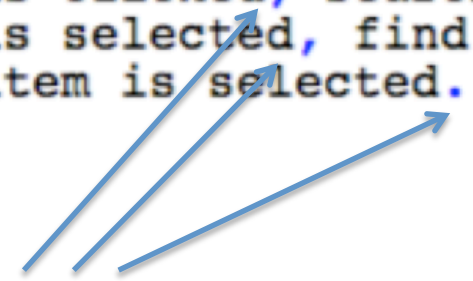
Requirements / Decisions	Expressiveness	Intuitiveness
Semi-Structured editor		X
Ingredients Toolbar	X	X
Component Dock		X
Drag & Drop		X

Semi-structured Editor

completely eliminates the possibility of making syntactical errors

```
when the map is clicked, find tweets around location,
```

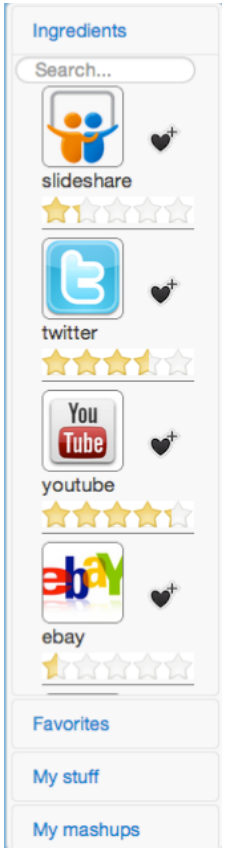
```
when the map is clicked, search google news around location.
when an item is selected, find youtube videos about Title.
when a video item is selected.
```



Punctuations are added automatically, while they can also be typed by the user

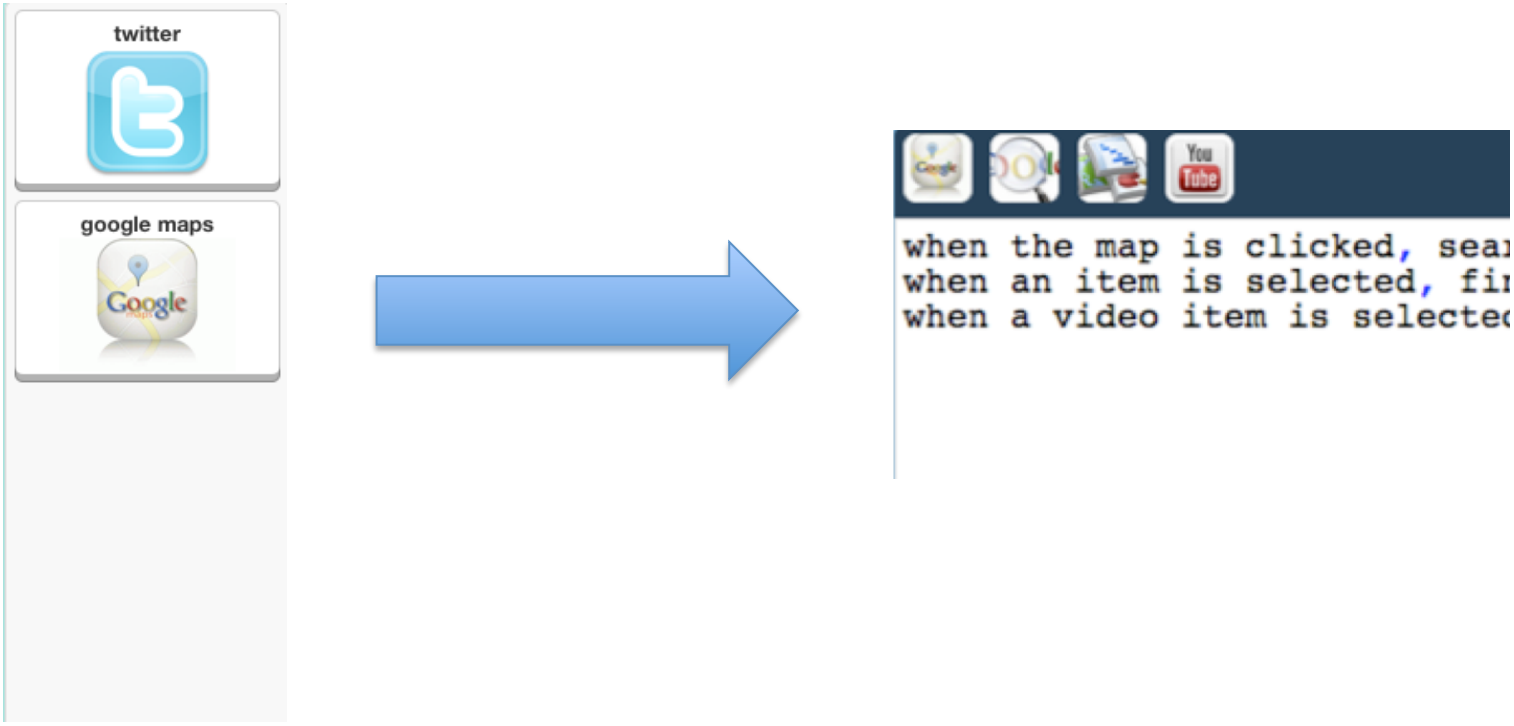
Ingredients Toolbar

shows a searchable list of available components (ingredients)



Component Dock

Shows which components (ingredients) are used in the mashup



Drag & Drop

Allows to add ingredients to the mashup being edited by dragging them from the toolbar and dropping it in the text field or visual field.

Feature Additions (**Iteration 2**)

Requirements / Decisions	Expressiveness	Intuitiveness
Composition suggestion	X	X
Categorizes examples for mashups	X	X
Stateful live programming		X

Formative Evaluation: Results

Task completion:
The majority (95%) of the participants (in both iterations) completed the tasks

Satisfaction and user experience:
The majority of the participants felt satisfied and positively about the tool.

Formative Evaluation: Results

Self-generated tasks:

- A mashup that measures the level of online presence in tourism, using social network APIs such as Twitter and Facebook.

- A mashup that enhances online shopping experience using eBay, Flickr, and Facebook.

- A mashup that delivers location-based news with related media content (video and image) using Google News, Youtube, Flickr, and Twitter.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